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Application Date (In United Kingdom): Oct. 3, 1941. No. 12815/41.

Complete Specification Accepted: April 7, 1943.



## COMPLETE SPECIFICATION

## Improvements in or relating to Joints for Fluid-Pressure Conduits

We, SOCIETE D'INVENTIONS AERONAUTIQUES ET MECANIKES S.I.A.M., of 1<sup>bis</sup>, Route des Alpes, Fribourg, Switzerland, a Corporate body organized under the laws of the Confederation of Switzerland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention comprises improvements in or relating to joints for fluid-pressure conduits.

It is known that it is frequently necessary in all kinds of hydraulic or pneumatic circuits to effect the rapid connection of conduits, or conversely, to disconnect two conduits connected together and to ensure at the same time, the blanking off of the separated conduits.

The invention has for its object to provide a joint for conduits which is adapted to be rapidly engaged or disengaged, without any screwing or unscrewing operation, locking and unlocking being effected by a simple movement, and of such construction that when the joint is uncoupled the separated conduits are automatically and instantaneously closed.

The invention includes a joint for fluid-pressure conduits which comprises, in combination, two joint-elements, namely a spigot and a socket, adapted to fit together, a valve in each of said elements constructed to open when moved inwardly but to close when moved outwardly so as to seal the passages through spigot and socket when they are separated from one another, a projection on each valve, the two projections being so located as to engage one another when the spigot and socket are united and thus to open each valve, a spring collet around one of the joint-elements, a locking face on the other joint-element to be engaged by the collet, and a locking ring slidable along the collet to contract it on to the locking face when the joint-elements have been brought together.

In British Patent Specification No. 174,745 there is described a connector for making grease-tight connection with nozzles or nipples having a nipple which

acts as a spigot, a ball-valve therein, a socket for connection to the nipple with a spring collet around it to engage a locking face on the nipple, and a locking-ring slidable along the collet to contract it on to the locking face when the socket and nipple have been brought together.

There was no suggestion in this case that the valve could be opened by the act of coupling the joint, nor of the use of valves in, both spigot and socket as in the case of the present invention.

The spigot is, according to this invention, preferably a sliding fit in the socket and the sliding joint-face so produced is sealed by a flexible joint ring located in the socket or around the spigot. This fluid-tightness of the joint does not depend on exact positioning in an axial direction and axial pressure such as to make a tight joint is not necessary.

The collet may be formed by a number of spring tongues extending axially from a ring which holds them together. Preferably the spring tongues are outwardly bulged towards their centre so that the locking ring may tend to be held normally in either its fully locked or fully unlocked position, as may be determined by the operator. Preferably a length of sliding engagement of the spigot in the socket is provided which is adequate to ensure that the sealing valves are closed before the spigot is disengaged. This prevents leakage during disengagement before the valves are closed.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawing, in which:—

Figure 1 represents an assembled joint, in longitudinal section;

Figures 2 and 3 are two sections showing the two parts of the joint, separately, before assembly.

Figure 4 shows in section one of the parts of the joint provided with a protecting plug;

Figure 5 is a detail of a collet.

The conduits to be connected, for example flexible tubes 1 and 2 are terminated by ferrule ends 3 and 4 on which are screwed respectively the two elements A

and B of the joint (Figures 2 and 3).

A spigot part A comprises a cylindrical spigot proper,  $a$ , and a root portion on which there is fixed, for example by screwing, a collet  $b$  shown in detail in Figure 5. The collet  $b$  is made in a sufficiently elastic metal, for example in spring steel. The general shape of the collet is cylindrical and slightly bulging in its central part. Slots  $c$  divide the collet into a series of spring tongues  $d$  terminating in heads  $e$  which provide internal and external projections from the collet. Over the collet fits a locking-ring  $f$ , terminated at one end by a head  $f^1$  and, at the other end by a base  $f^2$ . This ring is adapted to slide axially on the ring  $b^1$  which forms the root of the collet  $b$  and holds tongues  $d$  together.

The socket part B of the connection is constituted by a socket portion proper  $g$  having a bore corresponding to the diameter of the spigot  $a$ . The spigot is furthermore sealed with a flexible joint-ring  $h$ .

The spigot and socket  $a$  and  $g$  have on their contact faces orifices  $l^1-l^2$  and each of them contains a valve  $m^1-m^2$  which closes when moved outwardly and has a spring ( $n^1-n^2$ ) tending constantly to thrust the valve towards the closed position. The seating  $q^1-q^2$  on the valves bears against a seat  $p^1-p^2$  in the spigot or socket as the case may be.

There are made in each valve holes  $t^1-t^2$  adapted to establish communication of the interior of the valve with the corresponding orifice  $l^1-l^2$ , and each valve has a projection in the centre. The projections engage one another when the spigot and socket are engaged and so open the valves automatically.

The engagement of the joint takes place as follows:—

To liberate the elastic tongues  $d$  the collet closing-sleeve  $f$  is drawn back away from the heads  $e$  until it occupies the position shown by Figure 2. It is then possible to force the socket  $g$  inside the collet  $d$  and to enter the spigot  $a$  as far as the bottom of the bore of the socket  $g$ . In this position the inwardly projecting portions of the heads  $e$  of the spring tongues  $d$  overlap a locking face  $g^1$  on the socket  $g$ . It is then sufficient to slide the closing-sleeve  $f$  along the tongues  $d$  until the beading  $f^1$  of this ring closes the heads  $e$  firmly behind the locking face for the two parts A and B of the connection to be firmly locked one in the other without being able under any circumstances to separate accidentally, because the withdrawal of the part  $g$  from the collet necessitates the opening of the ends of the tongues and this opening out is prevented

by the beading  $f^1$  of the closing-sleeve  $f$ . Involuntary undesired sliding of this sleeve does not take place since it would necessitate an elastic deformation of the tongues  $d$  of the collet  $b$  owing to the bulged profile of these tongues. The deformation indispensable for permitting the liberation of the part  $b$  of the joint can only result from a considerable effort voluntarily exerted on the closing-sleeve to get this to pass over the central bulged portion of the tongues  $d$ .

In the assembled and locked position of the two parts of the connection, the stems of the valves  $m^1-m^2$  are in contact one with the other, and the corresponding springs are compressed. Consequently, a continuous and pressure-tight passage is obtained between the tubings 1 and 2, through the apertures of the valves  $t^1-t^2$  and the orifices  $l^1-l^2$ . At the moment of separation the springs  $n^1-n^2$  thrust the corresponding valves  $m^1-m^2$  against the seats  $p^1-p^2$ . The valves are thus closed and the tubings 1 and 2 are blocked in an entirely automatic and instantaneous manner by the simple process of undoing the connection. The spigot  $a$  and socket  $g$  are made long enough for their sliding engagement to continue until the valves  $m^1, m^2$  are closed, thus ensuring that no appreciable leakage takes place during the act of disconnection.

With the object of particularly protecting the most vulnerable element of this device, that is to say, the collet  $b$ , the invention also comprises the addition, to this joint of a protecting plug U connected to the tubing 1 by a small chain. This plug after separation of the two parts A and B, is placed in position on the part A by movements similar to those which have been described for the connection of the joint itself.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A joint for fluid-pressure conduits comprising in combination, two joint-elements, namely a spigot and a socket, adapted to fit together, a valve in each of said elements constructed to open when moved inwardly but to close when moved outwardly so as to seal the passages through spigot and socket when they are separated from one another, a projection on each valve, the two projections being so located as to engage one another when the spigot and socket are united and thus to open each valve, a spring collet around one of the joint-elements, a locking face on the other joint-element to be engaged by the collet, and a locking-ring slidable

along the collet to contract it on to the locking face when the joint-elements have been brought together.

5 2. A joint for fluid-pressure conduits as claimed in claim 1, wherein the spigot is a sliding fit in the socket and wherein the sliding joint-face so produced is sealed by a flexible joint-ring located in the socket or around the spigot.

10 3. A joint as claimed in claim 1 or claim 2 wherein the collet is formed by a number of spring tongues extending axially from a ring which holds them together.

15 4. A joint for fluid-pressure conduits as claimed in claim 3, wherein the spring

tongues are outwardly bulged towards their centre for the purpose described.

5. A joint as claimed in claim 2, wherein a length of sliding engagement of the 20 spigot in the socket is provided which is adequate to ensure that the sealing-valves are closed before the spigot is disengaged.

6. A joint for fluid-pressure conduits substantially as described with reference 25 to and as shown in the accompanying drawing.

Dated this 3rd day of October, 1941.

BOULT, WADE & TENNANT,  
111/112, Hatton Garden, London, E.C.1,  
Chartered Patent Agents.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

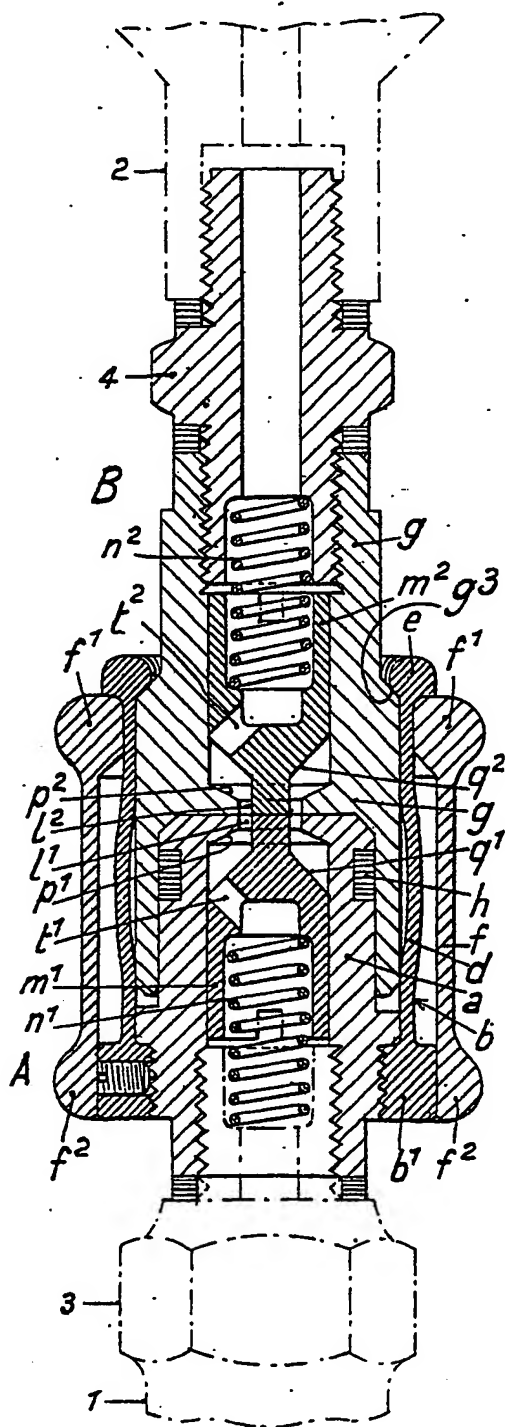


Fig. 3.

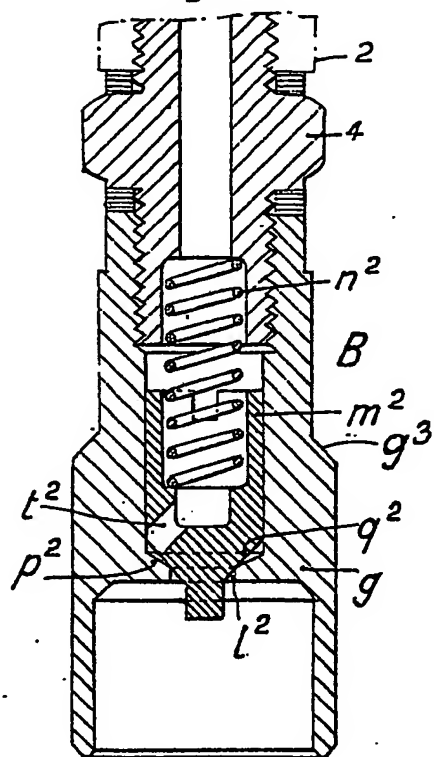


Fig. 2.

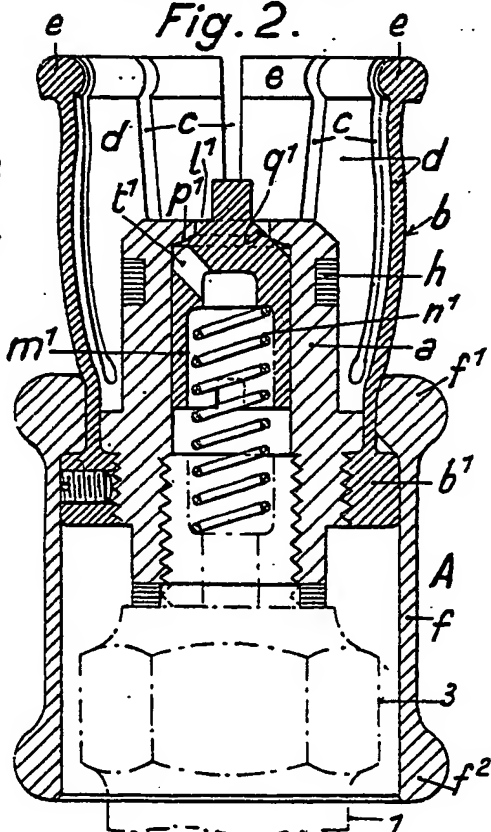


Fig. 4.

U

-2

} 4

-n<sup>2</sup>

B

-m<sup>2</sup>  
g<sup>3</sup>

q<sup>2</sup>

g

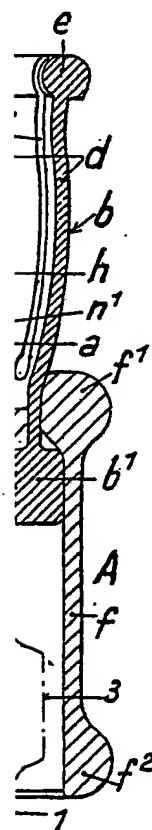
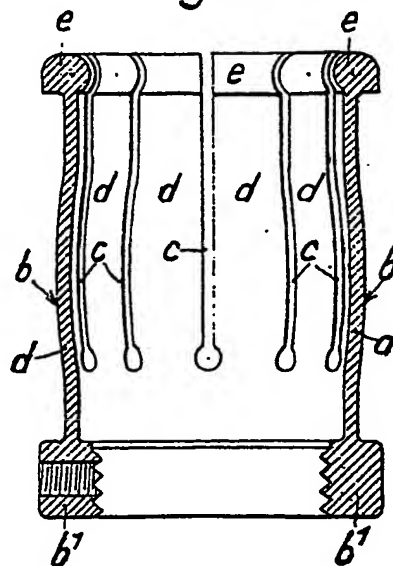


Fig. 5.



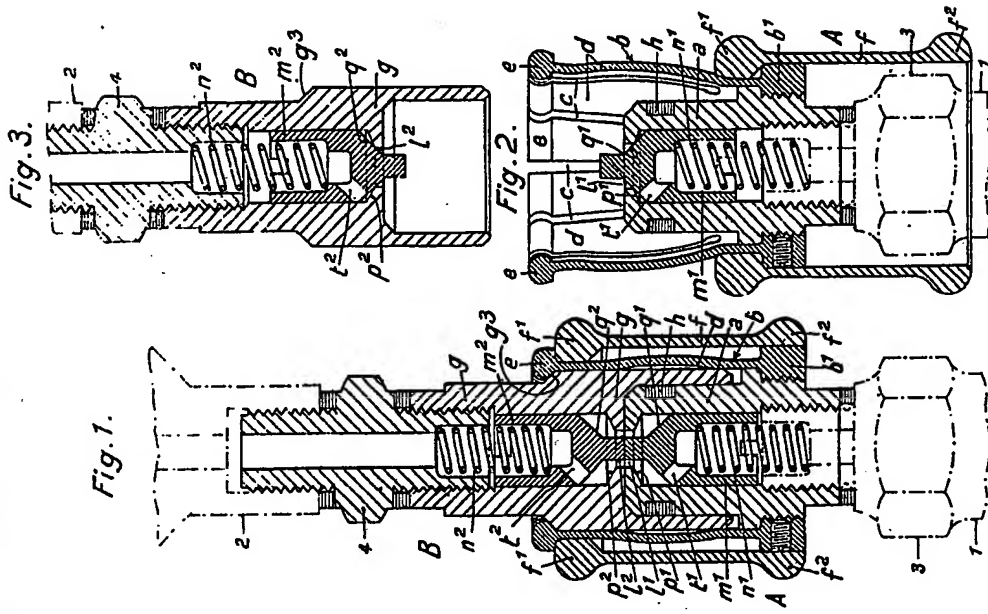


Fig. 1.

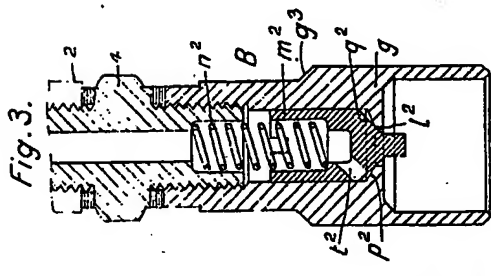


Fig. 2.

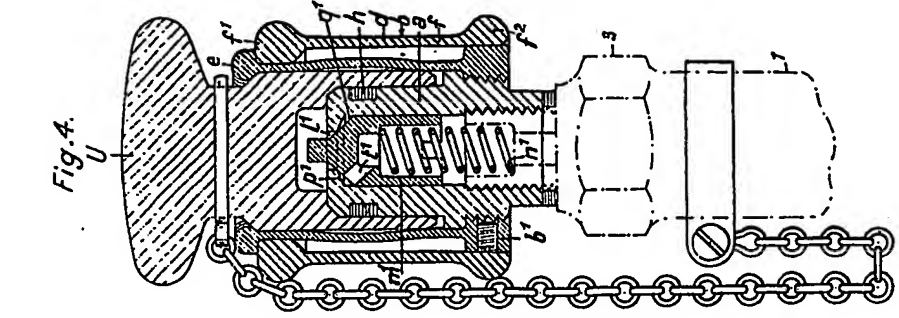
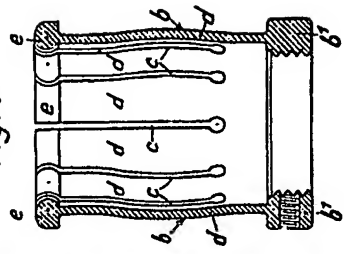


Fig. 3.

Fig. 4.

Fig. 5.



[This Drawing is a reproduction of the Original on a reduced scale.]